

PATENT SPECIFICATION



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549,498

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Complete Specification Accepted: Nov. 24, 1942.

PROVISIONAL SPECIFICATION

Improvements relating to Means for securing together a Pair of Members, such as a Crank and Spindle

I, ROBERT ERNEST FROGGATT, a British Subject, of 134, Orchard Road, Erdington, in the City of Birmingham, do hereby declare the nature of this invention to be as follows:—

This invention has for its object to provide improved means for securing a member, such as a crank, lever, wheel, disc or the like, to another member, such as a shaft, spindle, axle or the like, the two members being of the kind having adjacent parts adapted to fit one within the other.

The invention is more especially intended for securing cycle cranks to their shafts, but is applicable to other analogous uses.

The invention comprises the combination with the adjacent parts of the two members, of one or more interlocking pieces rotatably supported in one of the said parts at right angles to the axis thereof, the interlocking piece or pieces and the other of the said parts being formed with flats adapted to be brought into close contact with each other by relative axial movement of the said parts.

In one manner of applying the invention to the securing of a cycle crank to its shaft, the crank is formed at one end with a cylindrical hole, and one end of the shaft is adapted to fit this hole. At one side of this end the shaft is formed at right angles to its axis with a transverse groove of half-round section for rotatably supporting an interlocking piece in the form of a round pin having a flat on one side, the pin being slightly smaller in length than the diameter of the shaft end. To accommodate the pin the crank is recessed at one side of its hole, the base of this recess being flat, and being inclined to the axis of the crank so that the depth of the recess progressively diminishes from the end of the crank hole through which the shaft end is inserted. The flat on the pin and the flat base of the recess are adapted to be brought into close contact with each other by relative axial movement of the crank and shaft, this contact serving to determine the extent to which the shaft end can

enter the crank hole, and to prevent relative rotation of the crank and shaft. In this operation intimate contact of the flat faces on the pin and crank is automatically ensured by the pin being free to rotate in the shaft groove.

To secure the shaft end in the crank hole and to effect the required relative axial movement of the shaft and crank to bring the two flats above mentioned into close contact with each other, the shaft end is formed with a coaxial screw threaded hole, and in engagement with this hole is a screw having a head which bears through the medium of a washer on an adjacent part of the crank. Preferably the crank hole is enlarged at its outer end to accommodate the screw head and to provide a shoulder on which the washer can bear.

By tightening the screw the two flats are brought into close contact with each other and relative movement between the crank and shaft is effectively prevented.

Removal of the screw enables the crank to be detached from the shaft.

The invention is not limited to the example above described but may be modified in a variety of ways some of which will now be described.

In one modification the inclined flat may be provided on the shaft, and the interlocking piece may be mounted in the round transverse hole usually provided in a cycle crank for accommodating a cotter pin.

In another modification the required relative axial movement of the crank and shaft may be effected by a captive nut on the crank engaging a screw threaded end of the shaft.

In a further modification the relative axial movement of the crank and shaft may be effected by a nut freely rotatable on the shaft and in screw thread engagement with an adjacent part of the crank, the nut being adapted to bear against a collar or shoulder on the shaft. This example is suitable for securing a crank to a shaft at a position between the ends of the shaft, or for securing one end of the shaft in a blind hole in the crank.

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In some cases the collar or shoulder on the shaft may be dispensed with.

Alternatively the required relative axial movement of the crank and shaft may be effected by a screw threaded plug engaging a correspondingly screw threaded enlargement of the hole in the crank, the plug being adapted to act on the adjacent end of the shaft, and the interlocking piece and associated parts being arranged so that the flats can be brought into close contact with each other by screwing the plug into the said enlargement.

Moreover, instead of forming the crank with a hole for accommodating a part of the shaft, the end of the crank adapted to be secured to the shaft may be formed with a lateral extension adapted to fit either an axial hole in the adjacent end of the shaft or the interior of the shaft (when the latter is hollow), the interlocking piece being adapted to co-operate with the adjacent parts of the shaft and the crank extension, and the required relative axial movement of the shaft and crank being effected either by a screw passing through the crank into engagement with the shaft, or by a nut engaging a screw thread on

one of the members and a collar or shoulder on the other member.

In some cases the screw threaded member for effecting relative axial movement of the crank and shaft and holding them together may be dispensed with provided that the inclination of the tapered flat is sufficiently small to enable an effective interlocking action to take place between the flats when the latter are brought into contact with each other by relative axial movement of the shaft and crank.

Also more than one interlocking piece and associated parts may be employed if desired.

It is to be understood that the invention is not limited to the securing of cycle cranks to shaft, but may be employed in essentially similar ways for securing levers, wheels, discs, or the like to shafts, spindles, axles or the like, the members to be secured being either solid or hollow.

By this invention I am able to provide simple and effective means for rigidly securing a pair of members in coaxial relationship.

Dated this 1st day of August, 1941.

MARKS & CLERK.

COMPLETE SPECIFICATION

Improvements relating to Means for securing together a Pair of Members, such as a Crank and Spindle

I, ROBERT ERNEST FROGGATT, a British Subject, of 134, Orchard Road, Erdington, in the City of Birmingham, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has for its object to provide improved means for securing a member, such as a crank, lever, wheel, disc or the like, to another member, such as a shaft, spindle, axle or the like, the two members being of the kind having adjacent parts adapted to fit one within the other.

The invention is more especially intended for securing cycle cranks to their shafts, but is applicable to other analogous uses.

The invention comprises the combination with the adjacent parts of the two members, of one or more pins which is or are adapted to serve the sole purpose of interlocking the said parts, and which is or are rotatably supported by one of the said parts, the interlocking pin or pins and the other of the said parts being formed with flats adapted to be brought

into close contact with each other by relative axial movement of the said parts.

The invention also comprises means as specified in the preceding paragraph and having a screwed element adapted to effect relative axial movement of the said parts.

In the accompanying sheet of explanatory drawings:—

Figures 1 and 2 are sectional side views taken at right angles to each other of a cycle crank and shaft secured together in accordance with the invention.

Figures 3 and 4 are respectively similar views to Figures 1 and 2 illustrating a modified form of the invention.

Figures 5 and 6 are respectively sectional side views taken at right angles to each other, and Figure 7 is a sectional plan, of a further modified form of the invention.

In carrying the invention into effect as shown in Figures 1 and 2, the crank *a* is formed at one end with a cylindrical hole *b*, and one end of the shaft *c* is adapted to fit this hole. At one side of this end the shaft *c* is formed at right angles to its axis with a transverse groove *d* of half-round section for rotatably support-

ing an interlocking piece in the form of a round pin *c* having a flat *f* on one side. To accommodate the pin *c* the crank *a* is formed at one side of its hole with a recess *g*, the base *h* of this recess being flat, and being inclined to the axis of the crank so that the depth of the recess progressively diminishes from the end of the crank hole through which the shaft end is inserted. The flat *f* on the pin *c* and the flat base *h* of the recess *g* are adapted to be brought into close contact with each other by relative axial movement of the crank *a* and shaft *c*, this contact serving to determine the extent to which the shaft end can enter the crank hole *b*, and to prevent relative rotation of the crank and shaft. In this operation intimate contact of the flat faces *f*, *h* on the pin *c* and crank *a* is automatically ensured by the pin being free to rotate in the shaft groove *d*.

To secure the end of the shaft *c* in the crank hole *b* and to effect the required relative axial movement of the shaft and the crank *a* to bring the two flats *f*, *h* above mentioned into close contact with each other, the shaft end is formed with a coaxial screw threaded hole *i*, and in engagement with this hole is a screw *j* having a head *k* which bears through the medium of a washer *m* on an adjacent part of the crank. The crank hole *b* may be enlarged at its outer end as shown to accommodate the screw head *k* and to provide a shoulder on which the washer *m* can bear.

By tightening the screw *j* the two flats *f*, *h* are brought into close contact with each other and relative movement between the crank *a* and shaft *c* is effectively prevented.

Removal of the screw *j* enables the crank *a* to be detached from the shaft *c*.

The example shown in Figures 3 and 4 is distinguished from that shown in Figures 1 and 2 by the feature that the inclined flat *h* is provided on the shaft *c*, and the interlocking pin *c* is mounted in a round transverse hole *n* in the crank *a*, this hole being that usually provided in a cycle crank for accommodating a cotter pin.

Instead of extending transversely across the crank *a* and being open at both ends as shown in Figures 3 and 4, the hole *n* in the crank may extend longitudinally or obliquely along the adjacent end portion of the crank and may be closed at one end as shown in Figures 5 to 7. In this example the outer end of the crank hole *b* is of conical form, and the washer *m* on the screw *j* is of dished form and fits the conical end of the crank hole, so that when the screw is tightened the

interaction of the washer and the conical portion of the crank hole causes the relative axial movement of the shaft *c* and crank *a* to bring the flats *f*, *h* into close contact with each other. The portion of the screw *j* adjacent to its head is of tapered form and fits a complementary hole in the washer.

The invention is not limited to the examples above described but may be modified in a variety of ways. Thus, in one modification, the required relative axial movement of the crank and shaft may be effected by a captive nut on the crank engaging a screw threaded end of the shaft. In a further modification the relative axial movement of the crank and shaft may be effected by a nut freely rotatable on the shaft and in screw thread engagement with an adjacent part of the crank, the nut being adapted to bear against a collar or shoulder on the shaft. This example is suitable for securing a crank to a shaft at a position between the ends of the shaft, or for securing one end of the shaft in a blind hole in the crank. In some cases the collar or shoulder on the shaft may be dispensed with. Alternatively the required relative axial movement of the crank and shaft may be effected by a screw threaded plug engaging a corresponding screw threaded enlargement of the hole in the crank, the plug being adapted to act on the adjacent end of the shaft, and the interlocking piece and associated parts being arranged so that the flats can be brought into close contact with each other by screwing the plug into the said enlargement. Moreover, instead of forming the crank with a hole for accommodating a part of the shaft, the end of the crank adapted to be secured to the shaft may be formed with a lateral extension adapted to fit either an axial hole in the adjacent end of the shaft or the interior of the shaft (when the latter is hollow), the interlocking piece being adapted to co-operate with the adjacent parts of the shaft and the crank extension, and the required relative axial movement of the shaft and crank being effected either by a screw passing through the crank into engagement with the shaft, or by a nut engaging a screw thread on one of the members and a collar or shoulder on the other member. In some cases the screw threaded member for effecting relative axial movement of the crank and shaft and holding them together may be dispensed with provided that the inclination of the tapered flat is sufficiently small to enable an effective interlocking action to take place between the flats when the latter are brought into contact with each

other by relative axial movement of the shaft and crank. Also more than one interlocking pin and associated parts may be employed if desired.

- 5 It is to be understood that the invention is not limited to the securing of cycle cranks to shafts, but may be employed in essentially similar ways for securing levers, wheels, discs, or the like
10 to shafts, spindles, axles or the like, the members to be secured being either solid or hollow.

- By this invention I am able to provide simple and effective means for rigidly
15 securing a pair of members in coaxial relationship.

- Having now particularly described and ascertained the nature of my said invention and in what manner the same is to
20 be performed, I declare that what I claim is:—

1. Means for securing together a pair of members of the kind specified, compris-

ing the combination with the adjacent parts of the two members, of one or more pins which is or are adapted to serve the sole purpose of interlocking the said parts, and which is or are rotatably supported by one of the said parts, the interlocking pin or pins and the other of the said parts being formed with flats adapted to be brought into close contact with each other by relative axial movement of the said parts.

2. Means as claimed in Claim 1 and 35 having a screwed element adapted to effect relative axial movement of the said parts.

3. Means as claimed in Claim 1 and comprising the combination and arrangement of parts substantially as described 40 and as illustrated in Figures 1 and 2 or Figures 3 and 4 or Figures 5 to 7 of the accompanying drawings.

Dated this 29th day of June, 1942.

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Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1942.

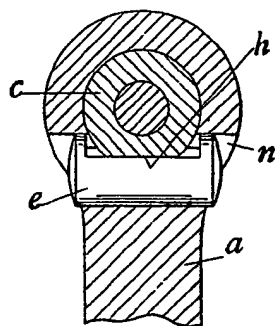


Fig.3

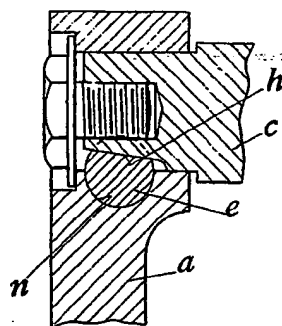


Fig.4

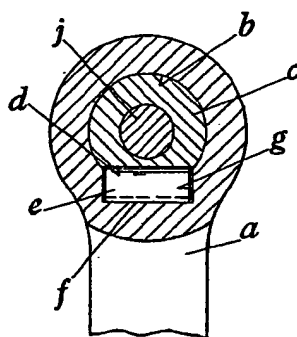


Fig.1

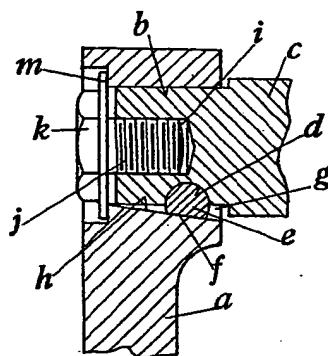


Fig.2

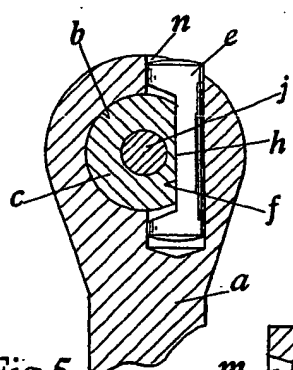


Fig.5

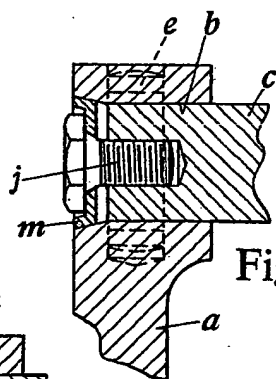


Fig.6

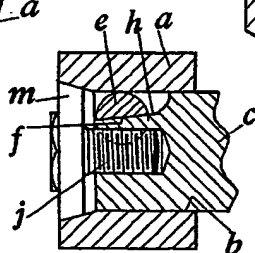


Fig.7

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[This Drawing is a reproduction of the Original on a reduced scale.]